Sharing a Wealth of Knowledge

Story by Grant Sattler

Across the Gulf Coast of Mississippi, U.S. Army Corps of Engineers employees are giving their time and expertise to help communities recover from the devastation of Hurricane Katrina. One recently spent a morning sharing his enthusiasm for science and Nature with local school children.

Thomas Kies, deployed from the Corps' Europe District in Germany, met with more than 70 children at Lizana Elementary School, north of Gulfport, Miss. Kies was deployed in support of Task Force Hope - Mississippi as a member of a Forward Engineering Support Team – Augmentation working with installation of temporary public structures.

After a visit to Lizana Elementary to site a structure, Kies offered to make the presentation he has shared with several classes at Department of Defense Dependant Schools at Ramstein Air Base, Germany. Kies, a UCLA graduate in civil engineering, shared a world map projection developed by visionary thinker Dr. Richard Buckminster Fuller that presents geographic information in a single, comprehensive picture without breaks in any of the continental contours, or any visible distortion of the relative shapes or sizes of the landmasses.

By way of a simple comparison game played using a globe, Fuller's Dymaxion Map, and a traditional Mercator map, the children were able to determine themselves which map more accurately depicts the spherical globe.

"Distortion is introduced when information is transferred from a spherical globe to a flat surface" Kies said. Unlike traditional maps where distortion is visibly apparent, the Dymaxion Map's distortion is so minimal that it is not perceptible to the naked eye, he said.

"I like to make them think, to steer them to the point of discovery on their own. When the students think for themselves they will learn and remember," he said of his teaching method.

Demonstrating the advantages of the Fuller Projection, Kies showed the children a reconstruction of how the Dymaxion Map can be folded from a two-dimensional flat map into a three dimensional icosahedron, a polyhedron with 20 triangular faces, which accurately depicts the spherical globe.

But this was not a just a geography lesson. Slicing an apple, Kies moved the question and answer discussion to the structural symmetry characteristics of Nature.

"The symmetry of the seed chamber of an apple, when it's sliced horizontally, will almost always reveal a five chamber star, which is similar to the five sided pentagon," Kies said, "sometimes there might be six which depicts the hexagon, but it almost always will be five."

With the pentagon introduced, an icosahedron can easily be constructed which models the apple's shape.

"Fuller died in 1983, when I was about the age of these kids," Kies said. "I just recently discovered his work and I've been fascinated about learning more." Kies, a hobbyist beekeeper, said bees do not build the hexagonal cells in honeycombs. Rather, they build close packed cylinders, and it is the material itself, the beeswax, that takes on the well-known hexagonal honeycomb shape. The effect can be demonstrated with soap bubbles gently compressed between two sheets of glass. "Bubbles and beeswax don't think…it is the way Nature builds. Nature is always optimal and most efficient," Kies said. "We can learn a lot from applying Nature's design to what we build."

Blowing soap bubbles will always yield a sphere, no matter the shape of the pipe or wand opening. "Spheres enclose the maximum volume for the least amount of surface area." Kies said. "Ergo, it's most efficient."

With magnetized rods and ball bearings, and sticks jointed with flexible tubing, he demonstrated the inherent structural instability in squares, the basic structure of contemporary architecture designed on right angles.

"Only the triangle is inherently stable, and to physically show the pupils this using models, the lesson experience is reinforced." Kies said. Diagonal bracing can be added to a square, yielding a triangle, and thus making it stable, he explained.

He then introduced the geodesic sphere which is entirely composed of triangular construction. "There can be thousands of hexagons in a geodesic design, but only 12 pentagons will exist in a geodesic sphere. The 12 pentagon caps of the icosahedron are the basis and foundation of geodesic domes," he said, breaking down complex concepts into simple components. Even at his home in Germany he constructed a two frequency, 18 foot diameter Geodesic Dome greenhouse.

Peppered by questions, Kies continued to share with the children until the lunch bell compelled them to leave. Not only was the morning an opportunity to share lessons he enjoys, but it was also another way to give back to the people of Mississippi. He said that as his first experience visiting the southern states, he has found the people really gracious, and resolute in the face of the disaster.

"The other day I was having dinner at Chef Scott's Sushi Bar in Ocean Springs and started talking with a couple who, as it turned out, had their home damaged and were living in a trailer. I told them a little about what the Corps is doing to help. They left and when I finished and went to leave, I was told they had paid my bill," Kies said. "It should have been the other way around. It's obvious to me that the southern hospitality is still alive after Hurricane Katrina."

▲ **Thomas Kies (left), Stephen Martinez (center) and Maj. Tom Asbery, all of Europe District, stop to take a look a photos to be documented for a structural analysis. Kies and team deployed to help with Task Force Hope - Mississippi.**

▼ **Kies shares his interest in science and Nature with more than 70 children at Lizana Elementary School, north of Gulfport, Miss. Kies took time form his deployment in support of Task Force Hope - Mississippi to spend time with the local students.**

Sharing a Wealth of Knowledge

Story by Grant Sattler

Across the Gulf Coast of Mississippi, U.S. Army Corps of Engineers employees are giving their time and expertise to help communities recover from the devastation of Hurricane Katrina. One recently spent a morning sharing his enthusiasm for science and Nature with local school children.

Thomas Kies, deployed from the Corps' Europe District in Germany, met with more than 70 children at Lizana Elementary School, north of Gulfport, Miss. Kies was deployed in support of Task Force Hope - Mississippi as a member of a Forward Engineering Support Team – Augmentation working with installation of temporary public structures.

After a visit to Lizana Elementary to site a structure, Kies offered to make the presentation he has shared with several classes at Department of Defense Dependant Schools at Ramstein Air Base, Germany. Kies, a UCLA graduate in civil engineering, shared a world map projection developed by visionary thinker Dr. Richard Buckminster Fuller that presents geographic information in a single, comprehensive picture without breaks in any of the continental contours, or any visible distortion of the relative shapes or sizes of the landmasses.

By way of a simple comparison game played using a globe, Fuller's Dymaxion Map, and a traditional Mercator map, the children were able to determine themselves which map more accurately depicts the spherical globe.

"Distortion is introduced when information is transferred from a spherical globe to a flat surface" Kies said. Unlike traditional maps where distortion is visibly apparent, the Dymaxion Map's distortion is so minimal that it is not perceptible to the naked eye, he said.

"I like to make them think, to steer them to the point of discovery on their own. When the students think for themselves they will learn and remember," he said of his teaching method.

Demonstrating the advantages of the Fuller Projection, Kies showed the children a reconstruction of how the Dymaxion Map can be folded from a two-dimensional flat map into a three dimensional icosahedron, a polyhedron with 20 triangular faces, which accurately depicts the spherical globe.

But this was not a just a geography lesson. Slicing an apple, Kies moved the question and answer discussion to the structural symmetry characteristics of Nature.

"The symmetry of the seed chamber of an apple, when it's sliced horizontally, will almost always reveal a five chamber star, which is similar to the five sided pentagon," Kies said, "sometimes there might be six which depicts the hexagon, but it almost always will be five."

With the pentagon introduced, an icosahedron can easily be constructed which models the apple's shape.

"Fuller died in 1983, when I was about the age of these kids," Kies said. "I just recently discovered his work and I've been fascinated about learning more." Kies, a hobbyist beekeeper, said bees do not build the hexagonal cells in honeycombs. Rather, they build close packed cylinders, and it is the material itself, the beeswax, that takes on the well-known hexagonal honeycomb shape. The effect can be demonstrated with soap bubbles gently compressed between two sheets of glass. "Bubbles and beeswax don't think…it is the way Nature builds. Nature is always optimal and most efficient," Kies said. "We can learn a lot from applying Nature's design to what we build."

Blowing soap bubbles will always yield a sphere, no matter the shape of the pipe or wand opening. "Spheres enclose the maximum volume for the least amount of surface area." Kies said. "Ergo, it's most efficient."

With magnetized rods and ball bearings, and sticks jointed with flexible tubing, he demonstrated the inherent structural instability in squares, the basic structure of contemporary architecture designed on right angles.

"Only the triangle is inherently stable, and to physically show the pupils this using models, the lesson experience is reinforced." Kies said. Diagonal bracing can be added to a square, yielding a triangle, and thus making it stable, he explained.

He then introduced the geodesic sphere which is entirely composed of triangular construction. "There can be thousands of hexagons in a geodesic design, but only 12 pentagons will exist in a geodesic sphere. The 12 pentagon caps of the icosahedron are the basis and foundation of geodesic domes," he said, breaking down complex concepts into simple components. Even at his home in Germany he constructed a two frequency, 18 foot diameter Geodesic Dome greenhouse.

Peppered by questions, Kies continued to share with the children until the lunch bell compelled them to leave. Not only was the morning an opportunity to share lessons he enjoys, but it was also another way to give back to the people of Mississippi. He said that as his first experience visiting the southern states, he has found the people really gracious, and resolute in the face of the disaster.

"The other day I was having dinner at Chef Scott's Sushi Bar in Ocean Springs and started talking with a couple who, as it turned out, had their home damaged and were living in a trailer. I told them a little about what the Corps is doing to help. They left and when I finished and went to leave, I was told they had paid my bill," Kies said. "It should have been the other way around. It's obvious to me that the southern hospitality is still alive after Hurricane Katrina."

▲ **Thomas Kies (left), Stephen Martinez (center) and Maj. Tom Asbery, all of Europe District, stop to take a look a photos to be documented for a structural analysis. Kies and team deployed to help with Task Force Hope - Mississippi.**

▼ **Kies shares his interest in science and Nature with more than 70 children at Lizana Elementary School, north of Gulfport, Miss. Kies took time form his deployment in support of Task Force Hope - Mississippi to spend time with the local students.**